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09/681,732	05/30/2001	Paul Joseph Stewart	200-1452 DBK	3348

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EXAMINER
STEVENS, THOMAS H

ART UNIT	PAPER NUMBER
2123	8

DATE MAILED: 09/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 09/681,732	Applicant(s) STEWART ET AL.	
	Examiner Thomas H. Stevens	**Art Unit** 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *various*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 were examined.

Information Disclosure Statement

2. The references, U.S. Patent 6,104,159 and "Quality Design" by J.M. Juran were not considered because of its distant relationship to vehicle simulation/ CAM/CAE.

3. Furthermore, the RAMSIS reference, dated 2002 was not considered for the following reason: The date of publication supplied must include at least the month and year of publication, except that the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not an issue. The place of publication refers to the name of the journal, magazine, or other publication in which the information being submitted was published. (MPEP 609 pg. 600-127 to 600-128; May 2004 issue)

Claim Interpretation

4. Office personnel are to give claims their **"broadest reasonable interpretation"** in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re*

Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551(CCPA 1969). See *also *In re Zletz,* 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322(Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow") .... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed .... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process. The examiner interprets software databases or libraries store pre-designed features.

Claim Rejections - 35 USC § 112

5. Regarding claims 1-3, the phrase "system" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention as well as statutory invention type ambiguity. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al. ("Computer-Aided Engineering" Ford Research Laboratory Technical Report #AJ449; (1999)). Chen et al. teaches computer-aided engineering (CAE) simulations for verification of design and intent and prediction of a wide range of mechanical behaviors of a vehicle, its systems, and components (abstract).

Claim 1. A system for design of experiments (DOE) using direct surface manipulation of a mesh model comprising (abstract): a computer system, wherein said computer system includes a memory, a processor, a user input device and a display device (pg. 3, section 1.2, Viewing); a computer generated geometric model stored in said memory of said computer system, wherein the model is in a computer-aided design (CAD) format (abstract); and wherein a user using the computer system for a design of experiments on the geometric model converts the CAD model into a mesh model, evaluates the mesh model using a computer-aided engineering (CAE) analysis, modifies a surface of the mesh model by varying a predetermined parameter, wherein the surface is modified using direct surface manipulation of the surface of the mesh model and the updated mesh model is used in the design of experiments (pg.4, section 1.5, with figures 2 and 3;pg. 6, figure 5; and pg. 10, section 2.7 DSM Menu).

Claim 2. A system as set forth in claim 1(abstract) wherein the computer system includes a knowledge-based engineering library, and the geometric model is

stored in the knowledge-based engineering library (Note: examiner interprets *vehicle.stl* file on pg2, section 1.1 as a knowledge bases feature of the data file or library).

Claim Rejections - 35 USC § 103

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 3,4, 6-14,16-20 are rejected under 35 U.S.C. 103 (a) as obvious by Chen et al. ("Computer-Aided Engineering" Ford Research Laboratory Technical Report #AJ449; (1999)) in view of Stewart et al., (U.S. Patent 5,731,816 (1998)). Chen et al. teaches computer-aided engineering (CAE) simulations for

verification of design and intent and prediction of a wide range of mechanical behaviors of a vehicle, its systems, and components (abstract); but doesn't teach linear algebra concepts such as a basis.

Stewart et al. teaches direct modeling of fillets and draft angles, which encompass basis functionality.

At the time the invention, it would have been obvious to one of ordinary skill in the art to use Stewart et al to modify Chen et al. since three-dimensional designs of this genre require polynomials to be linear independent as well as a spanning set.

Claim 3. A system as set forth in claim 1 (Chen: abstract) wherein the computer system uses direct surface manipulation of the surface of the mesh model to parameterize a vertex on the surface of the mesh model within a domain of a DSM feature (Chen pg.10, section 2.7, DSM menu), determine a displacement of the vertex relative to the DSM feature's maximum displacement using a basis function (Stewart: columns 4-5, lines 44-65 and 1-29, respectively), and modifying the vertex on the surface of the model by the displacement.

Claim 4. A method for design of experiments using direct surface manipulation of a mesh model, said method comprising the steps of: selecting a geometric model, wherein the model is in a computer-aided design (CAD) format (Chen: abstract); converting the geometric model into a mesh model (abstract); evaluating the mesh model using a computer-aided engineering (CAE) analysis

(Chen: abstract); determining whether to continue generating the design of experiments response (Chen: pg. 10, section 2.7); modifying a surface of the mesh model by varying a predetermined parameter, wherein the surface is modified using direct surface manipulation (DSM), the mesh model is updated and the updated mesh model is used in continuing generating the design of experiments response (Stewart: column4, lines 6-12), if determined to continue generating the design of experiments response (Chen: pg. 11); and using the results of the CAE analysis for the design of experiments (Chen: abstract, 1st paragraph).

Claim 6. A method as set forth in claim 4 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of modifying a surface includes the steps of: parametizing a vertex on the surface of the mesh model within a domain of a DSM feature (Stewart: column 3, lines 31-53); determining a displacement of the vertex relative to the DSM feature using a mathematical basis function (Stewart: columns 4-5, lines 44-65 and 1-29, respectively); and modifying the vertex using the displacement (Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5).

Claim 7. A method as set forth in claim 4 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of modifying a surface includes the steps of: defining a sketch plane containing a domain of a DSM feature and positioning the sketch plane relative to the surface of the model (Stewart: column 3, lines 31-67 and column 4, lines 1-27); locating a reference center within the domain (Chen:

pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); projecting a vertex located on the surface of the mesh model into the domain of the sketch plane(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); specifying a maximum displacement of the DSM feature by locating a reference vector centered at the reference center to define the height of the DSM feature in object space(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); specifying a basis function to determine a displacement of the vertex(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); determining a displacement of the vertex relative to the DSM feature using the basis function; and using the displacement of the vertex to modify the surface of the mesh model(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5).

Claim 8. A method as set forth in claim 7 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of selecting a mesh model stored in a memory of the computer system (Stewart: column 9, lines 34-55).

Claim 9. A method as set forth in claim 7 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of separating the surface feature modified using DSM from the mesh model and storing the DSM feature within an electronic database in the memory of the computer system (Stewart: column 9, lines 34-55).

Claim 10. A method as set forth in claim 7(Chen: abstract; Stewart: column 3, lines 31-53) including the step of modifying the deformation of a local area of the surface by changing a DSM feature parameter (Chen: pg. 10, section 2.7, DSM Menu, with figures 9 and 10).

Claim 11. A method as set forth in claim 7 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of refining the (Stewart: column 10, lines 14-60) number of elements of a surface feature modified using DSM.

Claim 12. A method as set forth in claim 8 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of selecting a CAD model and converting the CAD model into a mesh model includes the steps of: selecting a base mesh model from an electronic database stored in the memory of the computer system (Chen: pg. 10, section 2.7, DSM Menu, with figures 9 and 10; Stewart: column 9, lines 34-55); selecting a DSM feature from an electronic database stored in the memory of the computer system (Stewart: column 9, lines 34-55; and Chen: pg. 2, section 1.1); and generating a mesh model using the base mesh model and the selected DSM feature (Stewart: column 4, lines 44-65 and column 5, lines 1-41).

Claim 13. A method as set forth in claim 8 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of selecting a CAD model and converting the CAD model into a mesh model includes the steps of selecting a DSM feature from an

electronic database stored in the memory of the computer system and generating a mesh model using the converted mesh model and the selected DSM feature (Stewart: column 9, lines 34-55; and Chen: pg. 2, section 1.1).

Claim 14. A method for design of experiments using direct surface manipulation of a mesh model, said method comprising the steps of (Chen: abstract): selecting a base mesh model from an electronic database stored in the memory of the computer system (Stewart: column 9, lines 34-55; and Chen: pg. 2, section 1.1); selecting a DSM feature from an electronic database stored in the memory of the computer system; generating a mesh model using the base mesh model and the selected DSM feature (Stewart: column 3, lines 31-53, column 9, lines 34-55; and Chen: pg. 2, section 1.1); evaluating the mesh model using a computer-aided engineering (CAE) analysis (Chen: abstract); determining whether to continue generating the design of experiments response(Stewart: column4, lines 6-12); modifying a surface of the mesh model by varying a predetermined parameter, wherein the surface is modified using direct surface manipulation (DSM), the mesh model is updated and the updated mesh model is used in continuing generating the design of experiments response, if determined to continue generating the design of experiments response (Stewart: column 3, lines 31-42); and using the results of the CAE analysis for the design of experiments response (Chen: abstract).

Claim 16. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of modifying a surface includes the steps of: parametizing a vertex on the surface of the model within a domain of a DSM feature (Stewart: column 9, lines 17-26. Note: examiner is interpreting these steps similar in structure); determining a displacement of the vertex relative to the DSM feature using a mathematical basis function (Stewart: columns 4 and 5, lines 44-65 and 1-41, respectively); and modifying the vertex using the displacement (Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5).

Claim 17. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-53) wherein said step of modifying a surface includes the steps of: defining a sketch plane containing a domain of a DSM feature and positioning the sketch plane relative to the surface of the model (Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5;and Stewart: column 3, lines 31-53); locating a reference center within the domain (Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); projecting a vertex located on the surface of the model into the domain of the sketch plane(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); specifying a maximum displacement of the DSM feature by locating a reference vector centered at the reference center to define the height of the DSM feature in object space(Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5); specifying a basis function to determine a displacement of the vertex; determining a displacement of the vertex relative to the DSM feature using the basis function (Stewart column 3, lines 31-53; columns 4 and 5, lines 44-65 and

1-41, respectively); and using the displacement of the vertex to modify the surface of the mesh model (Chen: pg. 3,section 1.5, and pg. 5-6, section 2.2 with figure 5).

Claim 18. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of separating the surface feature modified using DSM from the mesh model and storing the DSM feature within an electronic database in the memory of the computer system (Stewart: column 9, lines 34-55).

Claim 19. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of modifying the deformation of a local area of the surface by changing a DSM feature parameter (Chen: pg. 10, section 2.7, pg.111; Stewart: columns 3 and 4, lines 64-76 and 1-12, respectively).

Claim 20. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-53) including the step of refining the number of elements of a surface feature modified using DSM (Stewart: column 3, lines 31-63; with Chen: pg. 10, section 2.8 with pg. 11).

11. Claims 5 and 15 are rejected under 35 U.S.C. 103 (a) as obvious by Chen et al. ("Computer-Aided Engineering" Ford Research Laboratory Technical Report #AJ449; (1999)) in view of Stewart et al., (U.S. Patent 5,731,816 (1998))

and in further view of Dehmlow et al (U.S. Patent 5,999,187 (1999)). Chen et al. teaches computer-aided engineering (CAE) simulations for verification of design and intent and prediction of a wide range of mechanical behaviors of a vehicle, its systems, and components (abstract); but doesn't teach linear algebra concepts such as a basis or computation fluid dynamics.

Stewart et al. teaches direct modeling of fillets and draft angles, which encompass basis functionality while Dehmlow et al. 3-D CAD by bounded volume procedures for, in part, computation fluid dynamics.

At the time the invention, it would have been obvious to one of ordinary skill in the art to use Stewart et al. and Dehmlow et al. to modify Chen et al. since three-dimensional designs of this genre require polynomials to be linear independent as well as a spanning set and would present advantageous results if the software platform were applied to practical appliances.

Claim 5. A method as set forth in claim 4 wherein (Chen: abstract; Stewart: column 3, lines 31-41) said step of evaluating the mesh model using CAE includes using computational fluid dynamics (CFD) (Dehmlow: column 5, lines 40-55 and column 17, line 58-62).

Claim 15. A method as set forth in claim 14 (Chen: abstract; Stewart: column 3, lines 31-41) wherein said step of evaluating the mesh model using CAE includes using computational fluid dynamics (CFD) (Dehmlow: column 5, lines 40-55 and column 17, line 58-62).

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is (703) 305-0365, Monday-Friday (8:00 am- 4:30 pm) or contact Supervisor Mr. Kevin Teska at (703) 305-9704. The fax number for the group is 703-872-9306.

Any inquires of general nature or relating to the status of this application should be directed to the Group receptionist whose phone number is (703) 305-3900.

September 10, 2004

THS

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